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(54) Dermabrasion apparatus having disposable sterilized components

(57) Dermabrasion apparatus operating by a flow of an air/reducing substances mix conveyed in sequence by a pneumatic system through a contacting handle (16) which comprises a carter housing a vacuum pump (12) and a cup inside which it is placed a mixing bottle (15) and a collecting bottle (17). The apparatus comprises at least one external source of pressurized sterilized air, or other suitable gas, said handle (16) and said bottle being (15, 17) disposable sterilized components.

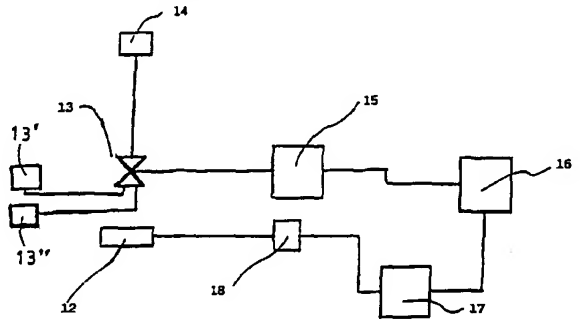

FIG.1

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Description

Field of the invention

The present invention relates to the field of the cosmetic and microsurgical treatments. In particular it refers to a microdermoabrasion apparatus and to its most relevant components, operating by a pressurized flow of air and reducing substances, preferably corundum (Al2O3).

Background of the invention

Several technical solutions to produce a microdermabrasion apparatus are already known, all comprising vacuum means and/or pressurizing means which send a flow of air and reducing subtances on a tissue portion to be treated and then remove from that portion the abraded particles. Such solutions have a drawback in that the sterility of the various components is not guaranteed, unless by complicated and expansive proceedings.

Italian patent application FI94A000131 describes a dermabrasion apparatus operating by a flow of reducing substances. The apparatus comprises a compressor, a vacuum pump, and three detachable onepiece components, a mixing bottle, a collecting bottle for the abraded particles and a contact handle to touch the tissue to be treated, those parts are preferably made of glass or plastic material and can be easily sterilized.

However, such apparatus has some drawbacks due to the fact that the air pressurization is performed by a compressor placed inside the apparatus and therefore uneasy to be sterilized. Thus, during the treatment the compressor could be infected by bacteria which would be afterwards conveyed on the patient's skin by the pneumatic system. Furthermore, the above mentioned one piece components are sterilized after the apparatus has been used, but they do not guarantee a proper sterility when the apparatus performes succeeding treatments on different patients. A further drawback is that dangerous contaminations can occur when the mixing bottle is filled with new reducing substances or when the collecting bottle is cleaned of the abraded particles.

Object of the invention

A first object of the invention is to ensure the highest sterility of the apparatus components in whatever circumstances, also when sterilization means as UV ray or autoclave are not available. A further object of the invention is to obtain easy replaceable, low cost apparatus components.

Summary of the invention

The abov objects hav been reached according to the invention by a microdermabrasion apparatus provided with disposable sterilized components consisting of easily interchangeable one piece blocks. Such components comprised an already filled mixing bottle containing the reducing substances, a collecting bottle for the abraded tissue particles, and an handle contacting the tissue during the treatment. All those components are manufacured and sealed in a sterilized environment. According to an embodiment of the invention the components are made of plastic material, preferably polycarbonate, in order to lower the costs, and to make them particulary suitable for disposable use. According to a still further embodiment of the invention, after manufacturing the components can be packed in sterilized packagings comprehending either a singol component or a multi-component kit. Thus, all the possible contamination risks are avoided, from the manufacturing to the use of the components. In order to avoid the contamination of the reducing substances, preferably corundum, with particles of the handle material abraded in the use, the portion of the handle most subjected to the abrasion effect is an abrasion proof block made of a suitable hard material, for example glass or ceramics. According to a further embodiment of the invention, the source of pressurized air, or of an other suitable gas, is constitued by at least one disposable bottle of sterilized pressurized air. In such way sterility is guaranteed to all the apparatus components exposed to contamination risks, for each single treatment. A further advantage is due to the low cost production of such components.

Drawings

Still further advantages will be evident from the following description and from the annexed drawings, given as a non limitative example, in which:

- fig.1 schematically shows the layout of the apparatus according to the invention;
- fig.2 shows a side view of the apparatus;
- fig.3 shows a front view of the apparatus of fig.2;
- fig.4 shows a preferred embodiment according to the invention of the mixing bottle filled with the reducing substances;
- fig.5 shows a preferred embodiment of the collecting bottle according to the invention;
- fig.6 shows a preferred embodiment of the contacting handle according to the invention;
- fig.7 shows a top view of the handle of fig.6;
- figs.8a,8b show different views of the abrasion proof block of the handle of fig.6;
- fig.9 shows one of the filters of the mixing bottle of fig.4.

Detailed description of the invention

Referring to fig. 1, a microdermabrasion apparatus 10 according to the invention comprises a carter 11 housing: a vacuum pump 12, a mixing bottle 15 containing the reducing substances, for example corundum, and a bottle 17 to collect the reducing substances and

the abraded tissue particles after use. Apparatus 10 is connected by a pneumatic system to an handle 16 intended to contact the tissue portion during the treatment. In the described embodiment it is also provided a valve 13 controlled by a switch 14, for xample a treadle switch, able to switch the air inlet from two different sources 13', 13". In a first example, the first source is a bottle of pressurized and sterilized air, and the second source is air at the enviromental pressure. In a further embodiment, the switching operates between two pressurized bottles feeding the sterilized air at different levels of pressure, so that the utilizer can vary the abrasion efficiency of the apparatus according to the treatment requirements and without interruption of the same. The same effect can be reached providing a single source with two outlet connections, adjusted to erogate the air at different pressures. Downstream the bottle 17 and upstream the vacuum pump 12 it is also provided a filter 18 to stop possible small particles flowing accidentally from the bottle 17.

In figs. 2,3 it is illustrated a possible embodiment of the carter 11, constitued by a casing 35, preferably made of plexiglass, and a bar 19 supporting the vacuum pump 12, where a couple of lateral flanges 20, 21, are connected by threated tie-rod 22. Carter 11 includes also a cup 23, fixed to the flange 20, housing the mixing bottle 15 and the collecting bottle 17. Flange 21 holds the filter 18 placed immediately upstream the vacuum pump 12. Referring to fig.4, the mixing bottle 15 is a substantially cilindrical one piece block obtained, for example, by ultrasound welding following an orizzontal junction line 9. Mixing bottle 15 is provided with connection pipes 24, 25 connected respectively with valve 13, not shown in the drawings, and with the pneumatic duct leading to the handle 16 according to the scheme of fig.1. Pipe connection 25 extends into the bottle 15 with a suction tube 26 having a hole 26' near to the bottom wall of bottle 15, through which the reducing substances are introduced into the pneumatic system. Tube 26 and the inner end of the pipe connection 24 are provided with labyrinths 40, 41 similar one to the other and schematically shown in fig.9. Labyrints 40, 41 present a T section with radial passages 42 through which the air can pass, whereas are avoided the accidental backflow of the corundum through the pipe 24 connection and the possible introduction of the same into the tube 26, during the trasporting operation.

According to the invention, the bottle 15 is filled with the corundum in an aseptic environment and thereafter is closed, preferably by welding, and then sealed by suitable plug 24' 25'. For example, each plugs 24', 25' can have a bottom rubber layer which is pierced by the extremities of corresponding connecting junctions of the cup 23 when the plugs are fitted into the cup. In such way the bottle 15 is connected with the valve 13 and with the downstream handle 16.

Referring to fig.6, handle 16 is constitued by a substantially cilindrical one piece block having the upper portion in shape of an hollow spherical cap. Handle 16 is provided with an inlet connection 27 corresponding to an inner tube 7 through which the air and the reducing substances enter into the spherical cap. After use, the reducing substances are removed from the spherical cap by a second tube 8 and a corresponding outlet connection 28. The handle spherical cap presents an opening 34 the rim of which defines the patient's tissue portion hit by the reducing substances ejected from tube 7.

According to the invention the upper end of tube 7, which is the part subjected to the highest abrasion, is provided with an insert block 7', shown in figs.8a,8b. Block 7' is a cilinder having an internal diameter smaller than the tube 7 diameter, so that in that point the flow area is smaller and the flow rate of the reducing substances increases. Block 7' is made of an hard material, preferably glass or ceramics. In the described embodiment, handle 16 is constitued by two half parts symmetrical in respect of section A of fig.7 and manufactured by injection moulding, toghether with the corresponding half parts of tubes 7,8. Before assembling, block 7' is inserted into the upper end portion of tube 7 and the spherical cap is put on so that the opening 34 corresponds to the block 7' position. After that the assembly is closed, for example by ultrasound welding according to section A and section B between the spherical cap and the cilindrical body. Alternatively, the spherical cap is welded to the lower cylindrical body obtained by a single injection moulding operation.

Referring to fig.5, it is described the collecting bottle 17, placed downstream handle 16 and upstream pump 12, according to the pneumatic system scheme of fig.1. Bottle 17 is constitued by a cylindrical hollow one piece block provided with two upper connections 29, 30, the first operating as inlet of the reducing substances from handle 16, the second as passage of the air aspirated by pump 12. Connection 30 is provided with an air filter 30' in order to avoid the passage of the used reducing substances and of tissue abraded particles towards the pump 12. In the described embodiment, bottle 17 is assembled by welding according to section 6, the upper portion comprehending connections 29,30. Immediately downstream the bottle 17 is placed a filter 18 intended to filter possible small particles passed through the filter 30' and conveyed towards pump 12. Advantageously, the connections of bottle 17 and handle 16 are provided with plugs similar to the already described plugs 24', 25' which are intended both to seal bottle 17 and handle 16 till they are first used, and to allow a quick connection to the pneumatic system. According to the invention, after manufacturing said bottle 15,17 and handle 16 can be packaged, one by one or in a unique kit, in a sterilized packaging, possibly comprehending the needed connection tubes. Said one piece blocks constitue a kit of disposable components which allows to avoid the stages of filling with the reducing subtances, cleaning of the abraded particles and of sterilization of the critical parts of the apparatus, which stages till now represented a drawback to the treatment safety and a further

increasing on costs and time. It is also possible to fix an expiring time for the sterility condition of the blocks contained in said unique kit packaging, so that, according to such time, all the critical parts of the apparatus can be safely an quickly replaced thanks to the described sealing plugs of blocks 15,16,17. Said blocks can be made of any suitable plastic or vetrous material. Anyhow, policarbonate is preferred because it is a low cost material and is sterilizable by autoclave when a reuse of one or more components is needed. According to a further feature of the invention, the kit components present different colours in order to allow a better identification of their functions by the user.

Claims

1. Dermabrasion apparatus operating by a flow of an air/reducing substances mix conveyed in sequence by a pneumatic system through a contacting handle (16), which comprises a carter (11) housing a vacuum pump (12) and a cup (23) inside which it is placed a mixing bottle (15) and a collecting bottle (17), characterized in that it comprises at least one external source of pressurized sterilized air, or other suitable gas, said handle (16) and said bottle (15,17) being disposable sterilized components.

2. Apparatus according to claim 1, characterized in that it comprises a valve (13) controlled by a device (14) switching on two or more pressurized sterilized air sources (13', 13").

3. Apparatus according to claim 1, characterized in that said pressurized air source is a pressurized sterilized air bottle.

4. Apparatus according to claim 1, characterized in that said switching device (14) is a treadle switch.

5. Apparatus according to claim 1, characterized in that said handle (16) and said bottles (15,17) are sealed by quick connection plugs, in order to allow a quick connection to the pneumatic system of the apparatus.

6. Mixing bottle of air and reducing substances in dermabrasion treatments, characterized in that it is a disposable sterilized substantially cylindrical body (15), containing the reducing substances and provided with connections (24,25) respectively to connect the valve (13) and the pneumatic duct leading to the handle (16), connection (25) extending inside the bottle with a suction tube (26) provided with a hole (26') through which the reducing substances enter into the pneumatic system, bottle (15) being filled with the reducing substances in a sterilized environment and then sealed by quick connection plugs (24', 25').

7. Bottle according to claim 6, characterized in that said plugs (24',25') presents bottom rubber layers which can be pierced by the extremities of corresponding connections of the cup (23), so that the bottle (15) is connected with the valve (13) and with the downstream handle (16).

8. Bottle according to claim 6, characterized in that said connection (24) and said tube (26) are provided with labyrinths (40,41) in order to avoid the accidental back flow of the reducing substances.

9. Bottle according to claim 6, characterized in that it is made of plastic material, preferably polycarbonate.

10. Collecting bottle of reducing substances in dermabrasion treatments, characterized in that it is constitued by a disposable sterilized substantially cylindrical body (17) having a first connection (29) connected to the handle (16) outlet and a second connection (30) connected to the vacuum pump (12) and provided with an air filter (30') to avoid the passage of particles towards the pump (12), said connections (29,30) being sealed by quick connection plugs.

11. Bottle according to claim 10, characterized in that said plugs have bottom rubber layers which are pierced by the extremities of corresponding connections of the cup (23), so that the bottle (17) is connected with the pump (12) and with the upstream handle (16).

12. Bottle according to claim 10, characterized in that it is made of plastic material, preferably polycarbonate.

13. Contacting handle for dermabrasion treatments, characterized in that it is constitued by a disposable substantially cilindrical sterilized body (16) with an hollow spherical cap having an opening (34), and it is provided with inlet and outlet connections (27,28) sealed by quick connection plugs, the outlet and inlet connections extending inside the handle with tubes (8,7) the latter being provided with at least an abrasion resistent block (7') preferably placed at the point most subjected to the abrasion effect of the flowing reducing substances.

14. Handle according to claim 13, characterized in that said block (7') is an hollow cilinder made of a hard material preferably selected from: glass, ceramics, metals, tungsten, suitably hard plastic materials.

15. Handle according to claim 13, characterized in that it is made of plastic material, preferably polycarbonate.

16. Dermabrasion treatment kit, characterized in that it comprises at least one of said disposable sterilized mixing bottle (15), contacting handle (16) and collecting bottle (17), preferably packaged into a sterilized packaging.

17. Kit according to claim 16, characterized in that said bottle (15,17) and said handle (16) present different colours in order to provide a better identification of their functions.

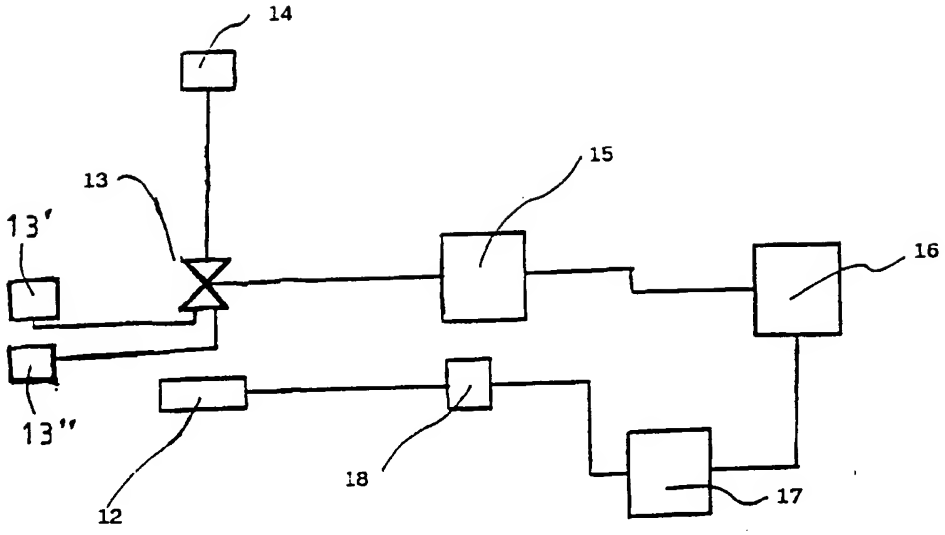

FIG.1

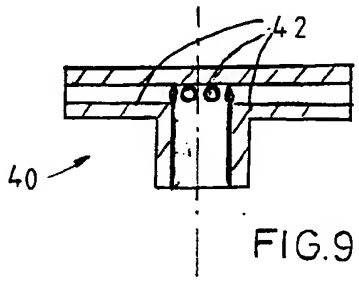

FIG.9

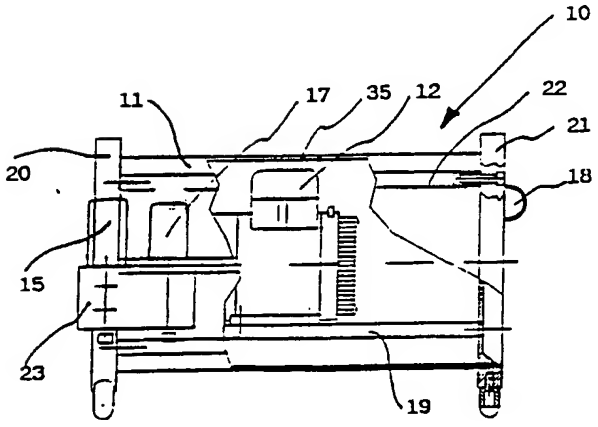

FIG.2

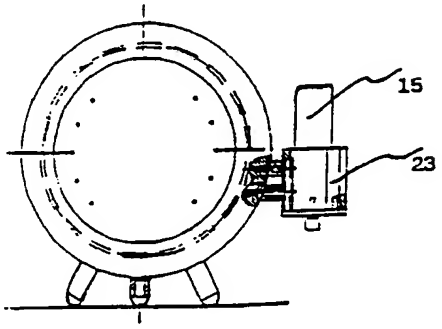

FIG.3

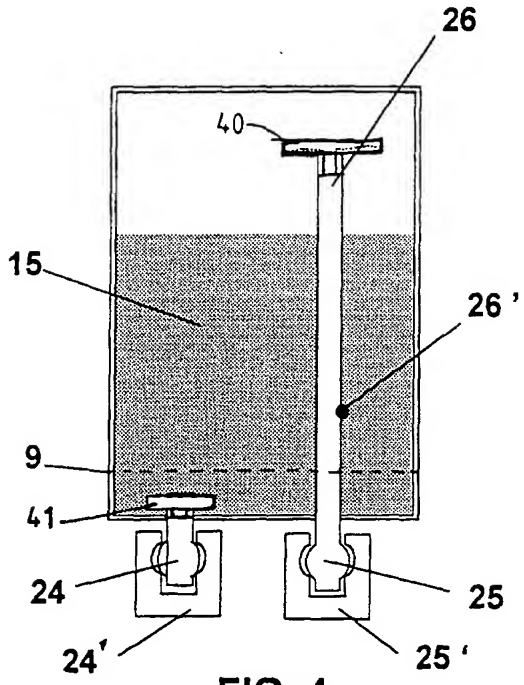

FIG. 4

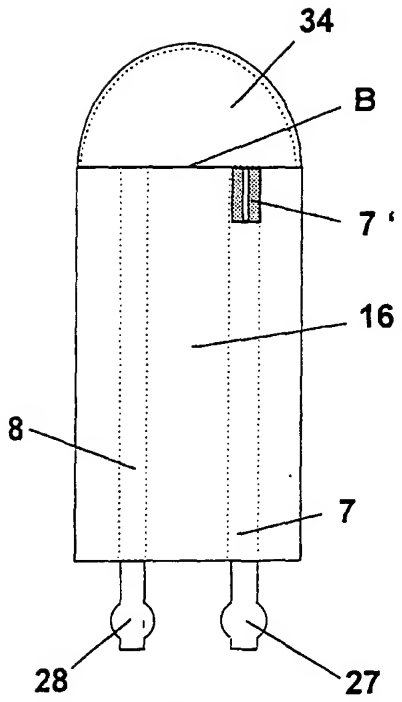

FIG. 6

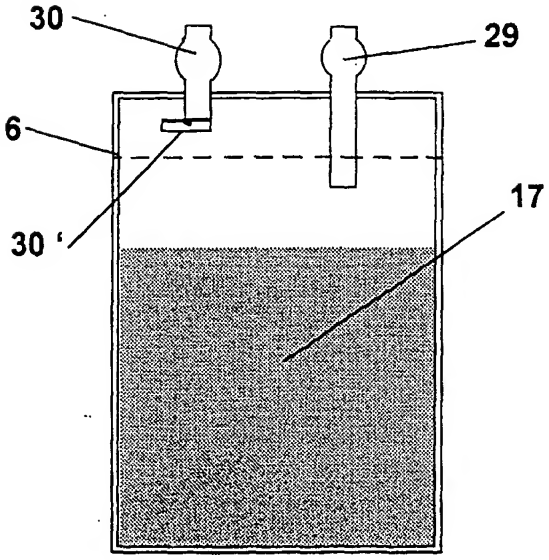

FIG. 5

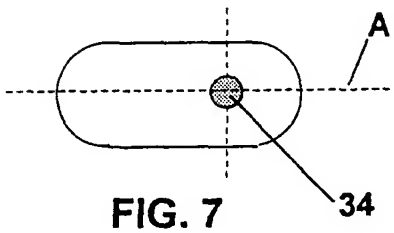

FIG. 7

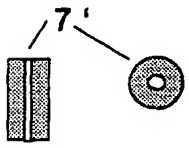

FIG. 8a

FIG. 8b

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 97 10 7639

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
Y	FR 2 712 172 A (RABIER) * abstract; claims 1,5,7; figures * * page 1, line 35 - page 3, line 15 *	1-6,10, 13-16	A61B17/54
Y	EP 0 564 392 A (FRUCTUOSO MARTINEZ) * column 1, line 48 - column 5, line 12; figures 1-4 *	1-6,10, 13-16	
A	EP 0 318 042 A (MOLINARI ET AL.) * abstract; figures * * column 1, line 21-40 * * column 2, line 26-49 * * column 3, line 34-43 * * column 4, line 32 - column 5, line 11 *	1,2,6, 10,13-15	
A	DE 92 15 436 U (VMS-MEDIZINTECHNIK VERKAUFS- UND MARKETING GMBH) * page 2, line 23-38 * * page 3, line 15 - page 4, line 24; figures *	1,6,10, 13	TECHNICAL FIELDS SEARCHED (Int.Cl.6) A61B A61C
A	DE 41 02 684 A (IONTO-COMED GMBH)	1,6,10, 13	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	14 August 1997	Giménez Burgos, R

CATEGORY OF CITED DOCUMENTS

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